NORTHROP GRUMMAN

Weapon System Support Software

Zachary Parham, Brandon Udall, Bradley Essegian, Dylan Motz

Mentor: Italo Santos

NAU NORTHERN ARIZONA UNIVERSITY

Our Clients & Business

Aerospace & Defense Contractor

- Armament Systems
- $30 billion in revenue / year

Harlan Mitchell

- Sr. Systems Engineering Manager

Laurel Enstrom

- Principal Systems Engineer

B-2 Spirit Stealth Bomber
Source: Northrop Grumman

RQ-4 Global Hawk
Source: Northrop Grumman

NORTHROP GRUMMAN

The Problem

Advanced Weapon Systems

Faults with these weapon systems produce a lot of data!

NG must dispatch engineers with a tool to collect data.

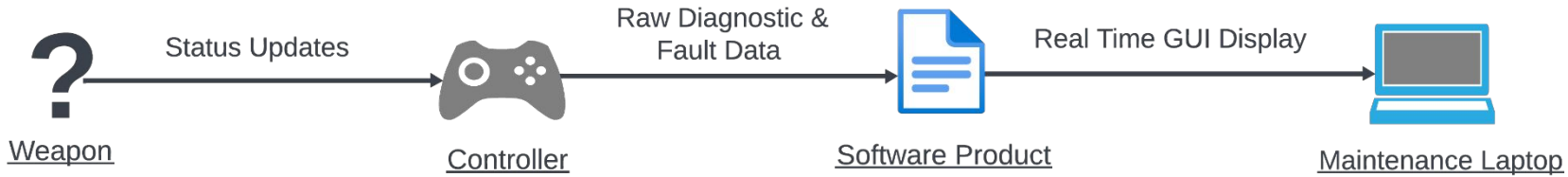
NG will work to resolve the problem, traveling to and from as much as needed.

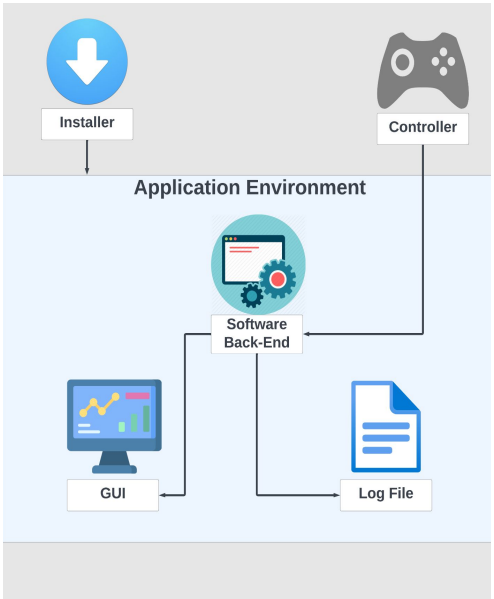
No end-user diagnostic tool

Complex, or insignificant data in existing tool

Expensive to dispatch engineers

Solution Overview

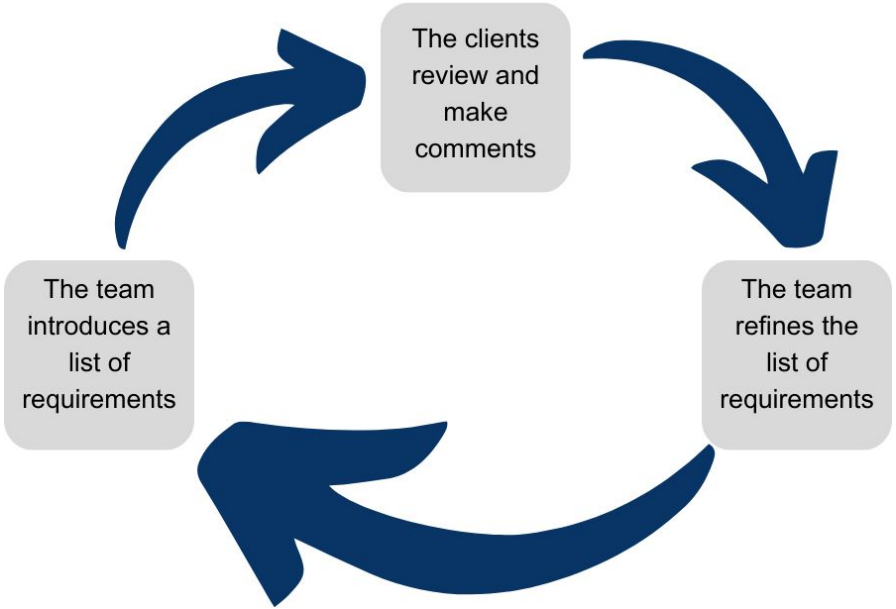




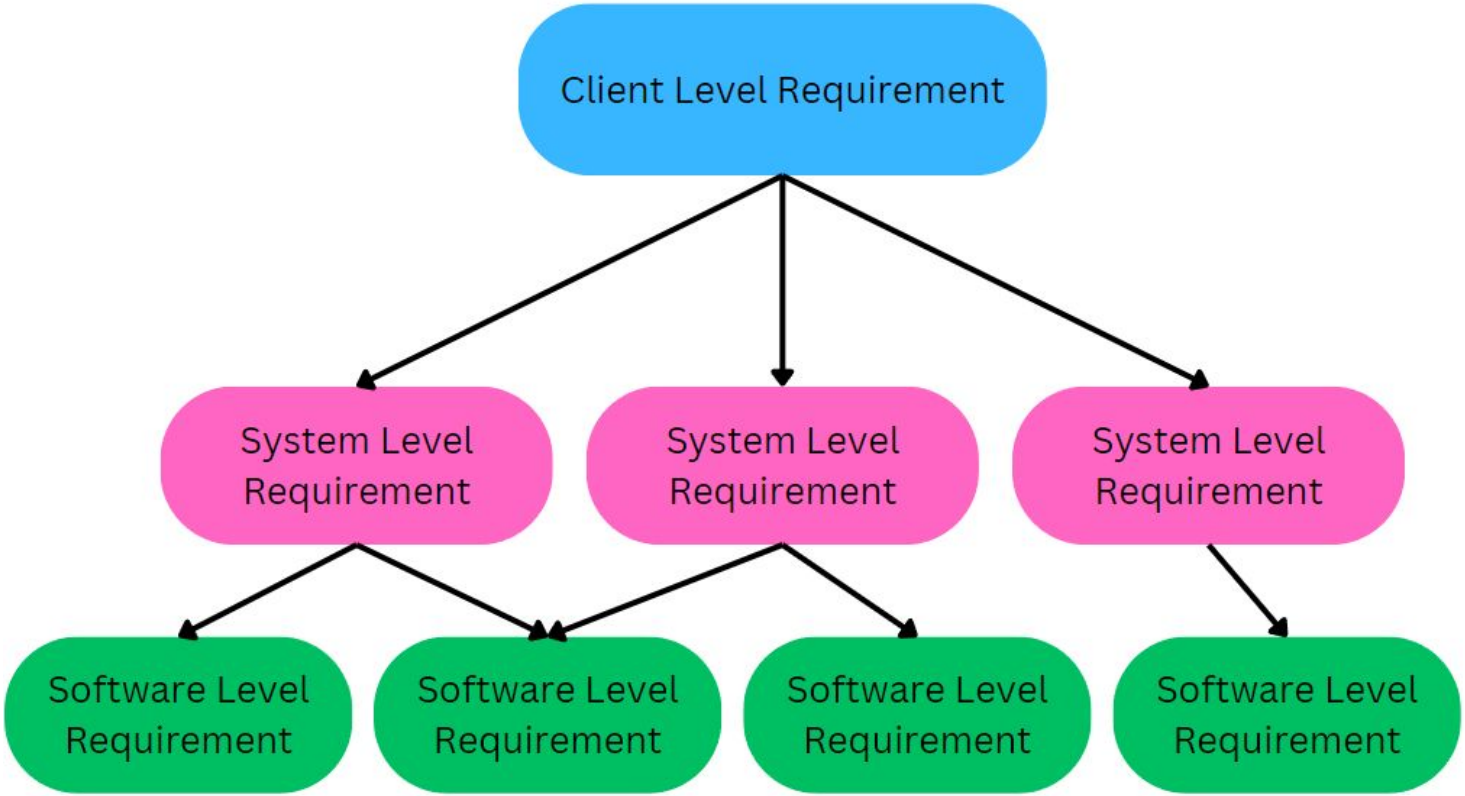
- Controller will give data into the software application
- The application will display the data into GUI and log file if selected by user
- The application will be installed by an installer that does not require administrator rights

Requirements Acquisition

- The team meets weekly with the clients
- Emails are exchanged as needed to provide in-depth feedback on requirements
- Files and important documents are shared on Github



Requirements Breakdown



Client Level Requirements

What our clients want:

- A graphical application that shall show the user information about the connected weapon
  - Must communicate to controller using RS422 serial communication
  - Status will be represented visually through graphics
  - Events and errors will be logged in csv format
- The system shall not require admin rights to setup or use
- The system shall be portable on Windows 10 and 11
- The system should be portable on Debian linux distributions
- The system shall be installed via installer file

Traceability Matrix

CR03 The data display module shall have the ability to write event data into a log file	**R07** The data display module shall be capable of generating a log file including all events up to the point in which the user requests the log file (this is the case for **generating a log file during a session**)	SR08 SR10 SR11 SR23
	R08 The data display module shall be capable of automatically generating a log file including all events that occurred during a complete session. (this is the case for **automatically generating a log file after a session has ended**)	SR08 SR10 SR11
	R09 Up to 5 auto-saved event log files shall be stored in the log file folder until overwrites occur on the oldest auto-saved file.	SR11

- **SR08 -** The function initializeEventLL() shall be capable of creating a head node for a linked list given an event string.
- **SR10** - The function addEvent() shall be capable of adding a new event to the event linked list.
- **SR11 -** The function outputEventLog() shall be capable of writing a log file, given a linked list of event data.

Risks and Feasibility

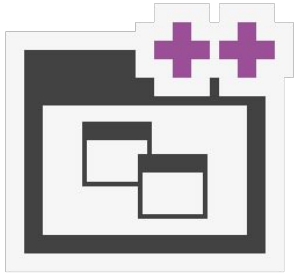
Risks

Misinformation

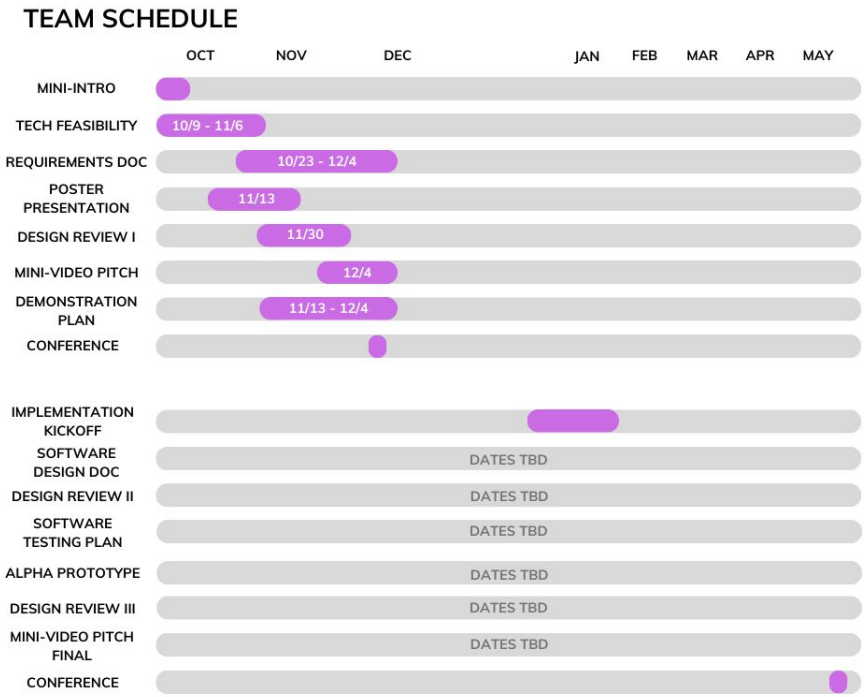
- Incorrect controller information
- Software Miscalculations
- Serial Protocol Encoding/Decoding Errors

Improper port hardware

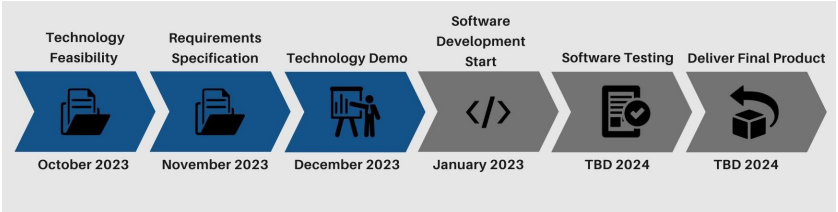
Feasibility



Schedule



- Development Phase
  - Agile sprints
- Testing Phase
- Final Product



Conclusion

Our clients are Northrop Grumman and the main issues are:

- Long travel times
- Complex data

Our goal is to provide our clients with an easy to use desktop application that anyone can use.

Our plan is to meet with our clients weekly throughout development and follow all the requirements and avoid the risk.